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Br. Sol Spiegelman
Department of Bacteriology
University of Illinois
Urbana, Illinois.

Dear Sol:

Seymour relayed your request for more details on preservation of microbes on silica gel. The basic principle is obvious: to use a chemically inert desicant so that it need not be separated from the microbes. It was hoped that adequately dried bacteria could not be influenced by the presence of oxygen, so the procedure has consisted simply of adding a small volume of concentrated suspension to a pre-sterilized tube of the gel, then sealing off directly. If the tubes have to be evacuated, several extra steps (constricting tubes with a torch,; evacuating, and then sealing) are needed, and there would be no advantage over the technique used by Brown, Hershey, Lindegren, etc.

I wish I could rpport a well-developed method, but a good deal of experimentation of a rather odious kxxx sort (with long waiting periods) is still needed. With cells suspended in peptone, there is a process loss of 1-2 bels, and over a 90 day period a continued attentation amounting to about 5 bels per year. At this rate, a year would be the maximum, but all depends on whether the attenuation curves continue, or fall off. I have been using several types of silica gel from the Davison Company, Baltimore, Md. Their purest grade is "Code 40", 6-16 mesh, and sells for about .70 per pound.

There are at least two innovations that should be tried: a protein menstruum rather than peptone, and perhaps adding the suspension to a layer of filter paper or glass or the like just over the silica column. Most of all, I don't know the optimum moisture conditions: I suspect that it is rather easy to obtain preps. that are <u>too</u> dry. Published work refers to 1-2% residual moisture as optimal by the stahdard methods, but it is rather difficult to calculate the vapor pressureϕ over the cell mass, which kxx is the critical and controllable parameter when silica is used. The usual methods do not establish a true equilibrium between the cells and the dessicant or vapor trap, and the dessicants used (e.g. $CaCl_2$) probably have to be calculated at the vapor pressure of a saturated solution, considering the quantities usually prescribed.

Here is a good example of a technical innovation that has a theoretically sound basis, and that would be very worthwhile (especially to geneticists with thousands of cultures), but which may require an amount of empirical work that would be prohibitive for one person (like myself). In some respects, it would make an excellent problem to be approached from a biophysical point of view, and one that would have important implications for general biology: what is a viable, dried cell? Meanwhile, I have been playing with the system a bit, in rather discouraged fashion. Silica gel is excellentbfor short-term preservation and mailing cultures. Perishability, esppcially with respect to freezing, is greatly reduced.

Sincerely,